



Letter to the Editor

Head injury with unilateral optic nerve enlargement: Could it be caused by increased intracranial pressure?

We read with great interest the case report of Carson et al. in the July issue of the Journal of Forensic and Legal Medicine.¹ To explain the unilateral enlargement of the right optic nerve, the authors discussed various etiologies, mostly local problems in the orbit, and stated that it can be attributed to the skull fracture that involved the right orbital plate (which did not transect the optic nerve). We would like to go further into the debate, and highlight that we could hypothesized that, in this patient with cranial trauma injury and “brain dead”, the increase of the optic nerve diameter could be due to the raised intracranial pressure.

The optic nerve sheath complex is composed of the optic nerve itself and by the perioptic nerve sheath, which is made up of leptomeninges and is continuous with the dura mater of the brain. In contrast to all other cranial nerves, the optic nerve is covered by the meninges and surrounded by cerebrospinal fluid throughout its full length.² The optic nerve sheath features a baseline diameter that remains stable as long as intracranial pressure is maintained within normal limits. When intracranial pressure rises, the cerebrospinal fluid flows towards the perineural subarachnoid space and increases the pressure around the optic nerve. This results in expansion of the dural sheath and papilledema with an increase in the optic nerve sheath diameter. Liu et al. confirmed the link optic nerve-intracranial pressure in fresh cadavers by performing saline infusions through a ventriculostomy to achieve various levels of intracranial pressure.³ They observed a linear relationship between the intracranial pressure and the subarachnoid pressure of the optic nerve as recorded through an orbitotomy.

Of course, in intracranial hypertension, the enlargement of the optic nerve is classically bilateral, but it can occur in only one eye.^{4–6} And recently, based on histological and biochemical studies, Killer et al. reported that the subarachnoid space of one optic nerve can become separated from other cerebrospinal fluid compartments in certain pathological conditions, thus leading to an optic nerve sheath compartment syndrome, that could be evoked in the case reported by Carson et al.⁷ Moreover, these links between intracranial pressure and optic nerve have important practical applications. For example, the sonographic examination of the optic nerve is commonly employed in the non-invasive assessment of the intracranial pressure in patients with brain injury.^{8,9} And optic nerve sheath decompression is a therapeutic option in the management of raised intracranial pressure.¹⁰

Conflict of interest

None.

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